PROCEEDINGS OF THE SOCIETY.

Meeting of April 13, 1939.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on Thursday, April 13, 1939, at 8:15 P.M. President William T. Davis presided, and nine other members were present, namely, Dr. Dietrich, and Messrs. Buchholz, Dietz, Engelhardt, Gaul, McElvare, Pechuman, Siepman and Stecher; also Dr. R. E. Blackwelder and Dr. A. Glenn Richards, Jr.

The minutes of the previous meeting were read and approved. Mr. Engelhardt reported as treasurer, stating that all of the Society's bills have been paid. He also read a letter from Mr. Torre-Bueno, stating that there was enough manuscript on hand to take care of the Bulletin until October, but that there was, as usual, a need of short notes.

Mr. Engelhardt proposed for membership, Mr. Edwin Way Teal, 93 Park Avenue, Baldwin, Long Island, N. Y.

The by-laws were suspended, and Mr. Teal was duly elected a member.

Mr. Davis showed a copy of a recent book by Mr. Teal, "The Boy's Book of Insects," and also commented upon "Grass Root Jungles," an earlier book by the same author.

Mr. Gaul showed a box of beetles collected by Snyder in Korea; the lot, as a whole, looked very much like material that might have been collected in the northeastern United States. Many of the genera are identical with our own, but the species, of course, are not the same.

Various members commented upon the late season. Dr. Richards said that mosquitoes were reported three weeks behind time, based on larval determinations.

Mr. Buchholz said that he had obtained cocoons of an imported species of bagworn, *Fumis casta,* at Great Notch, N. J., from which he bred four adults of each sex. The female is remarkable for having a long ovipositor. Specimens were identified for him by Mr. Jones. The species was previously known from Massachusetts and Philadelphia.

Dr. A. Glenn Richards, Jr., addressed the society on the subject of "Insect Regeneration, or New Parts for Old."

Opening his talk with a reference to St. Denis, who, according to the legend, after being beheaded, tucked his head beneath his arm and walked away, Dr. Richards discussed the effect of decapitation upon insects. A bedbug, for instance, if beheaded, will continue to live for several years, its "expectancy of life" being in no

way diminished. The silkworm moth, too, when decapitated, will continue to live as long as it normally would, which is about two weeks. The beheaded female will mate, lay eggs (though not quite as many are laid), and produced normal offspring. The headless male, on the other hand, loses interest in the opposite sex, probably because he normally is attracted by odors received by sensory organs located in the head, and which are now absent.

In Europe, experiments were made with hydrophilid beetles, in which heads were severed from the beetles and transplanted on other individuals. The heads, in some instances, would fuse to their new bodies, and from all outward appearances, the head was thoroughly welded to the body of the insect. Further investigation, however, showed that only the integuments fuse, and that the internal tubes and tissues do not make contact. Beetles with new heads are not capable of doing anything a decapitated insect cannot do.

The term death, as ordinarily used, has a dual connotation. It refers sometimes to the breakup of the coordinated system of reactions ordinarily associated with life, and sometimes to the disintegration or rotting of the individual cells that compose the body. In a decapitated insect, there is death of the first sort, associated with its habits. It can carry out various reflex and other actions induced by local stimuli, but it cannot act as a coordinated whole. Death of the second sort takes place at a later time, and in the case of insects, much later.

Regeneration of some sort takes place in all animals, though this power is present to a greater degree in animals lower in the scale, and in young animals. In human beings, the replacement of worn out cells, and of hair and finger nails, and the formation of scar tissue, are familiar forms of regeneration that take place throughout life. The replacement of parts not ordinarily lost, however, takes place only in the lower animals. A salamander, young or old, might replace a lost tail. The flatworm, *Planaria,* a simple organism whose chief anatomical features are a combination mouth and anus, and a pair of eye spots, is an interesting case. If cut in half, each half will grow the missing parts. If cut into smaller parts, each part grows a head and a tail. If a cut is made with two surfaces, a head or tail, as the case may be, grows on each surface.

If a living sponge is pushed through silk bolting cloth, virtually separating the animal into its individual cells, these cells seemingly grow together again, increase in size, grow new cells and organize into a recognizable sponge.

In insects, too, regeneration of lost parts is possible, and the literature on the subject is considerable. Thousands of cases are

recorded, in almost all the orders except higher Hymenoptera and Diptera. The various parts reproduced include antennae, compound eyes, mouth parts, spiracles, imaginal wing discs, legs, cerci, caudal horns, larval gills, and bristles. In certain beetles the last segment or segments of the abdomen when cut from the larva, have been reproduced in the adult. There is only a single record of a beetle regenerating as many as three abdominal segments. Internal segments, as a rule, are not reproduced, except at the extreme ends of the animal.

The process of regeneration is briefly this: After the part is severed, the blood clots, although in some insects the blood neither clots nor discolors. Not until the next ecdysis, when the chitin is shed, does a segment of the missing part make its appearance. At the next molt, another segment is developed, until the normal number is reached. The segments may not be in perfect proportion, but they become more and more perfect in subsequent molts.

Not every insect that is mutilated will regenerate the missing part, and, as a matter of fact, in most cases nothing will happen at all. But in some cases, regeneration does take place, and various experiments have been made. Thus, in a caterpillar, a proleg and a pseudopod have been removed and transposed. With subsequent molts, the front leg changes to a thoracic leg, and the thoracic leg, in its new position, develops as it should, but is shed like an abdominal leg. If the first and third thoracic leg-rudiments are transposed in the larval stage, and the insect is successfully reared to maturity, the front leg and the hind leg will each be of normal size, but the antenna cleaner, instead of being on the front leg, as it should, will be on the hind leg.

Sometimes when parts are lost, normal regeneration of the lost part does not take place, but some other part grows in its stead, as, for instance, a leg in place of an antenna. An appendage or an organ is always replaced by one which is normally further back in the insect; never the reverse.

As an insect is confined in a shell that cannot stretch, no regeneration can take place in the adult, because it no longer sheds its skin. Silverfish, however, which continue to shed their skin after sexual maturity, can regenerate lost parts even in the adult stage.

Regeneration takes place only in tissues whose fate has not been entirely determined. In Diptera there is no regeneration because the parts of the body are determined at a very early stage, and if a portion is removed from the egg, that portion will be lacking in the adult.

The meeting adjourned at 10:10 P.M.

Carl Geo. Siepmann, *Secretary*.